IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Uzoh et al.	Examiner:	Not assigned
Serial No.	Not assigned	Art Unit:	Not assigned
Filed:	July 13, 2001		

Title (Amended): PACKAGING DEPOSITION METHODS

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July 13, 2001

PRELIMINARY AMENDMENT

Hon. Asst. Commissioner for Patents
Washington, D.C. 20231

Sir/Madam:

Prior to action and/or consideration, kindly enter the following amendments and remarks. Please examine the above-identified application in view of the following Preliminary Amendment.

IN THE TITLE

Kindly delete the present title and replace it with the following new title: -- PACKAGING DEPOSITION METHODS --.

IN THE SPECIFICATION

Insert before the first line of the specification --This is a divisional application of U.S. Serial No. 09/398,258, filed September 17, 1999.--

Page 19, please delete the first full paragraph starting on line 5 and replace with the following new paragraph:

The sixth element/compound of the conductive material is an agent that passivates or enhances the passivation of copper or other metal materials. These agents may include benzotriazole, or combinations of benzotriazole with organic triazoles, such as benzotriazole-1-acetonitride, benzotriazole-5-carboxylic acid, 0-benzotriazole-1-yl-N, N′, N′-bis (tetramethylene) uronium hexafluoro phosphate and combinations thereof. The concentration of the passivating agents should range from 0.0005M to 0.1M, but preferably between 0.001 M to 0.2 M. Also, the highly leveling additives and the corresponding inhibitors described above may be used as passivating agents. What is important from this example is that the concentration of the passivating agent is adequate for the CMP process and is also below the threshold level that allows for conductive material deposition. Above this threshold level, hydrogen can be deposited at the cathode instead of the conductive material.

Page 20, please delete the second full paragraph starting on line 18 and replace with the following new paragraph:

By depositing at a current density slightly higher than 10 mA/cm^2 (i.e., 10.5 mA/cm^2), a thin continuous uniform overburden is formed over the entire top surface of the substrate. The depth of the overburden may range from 0.1-10000 A^0, or even higher, depending on the desired structure. Thus, by varying the deposition rate and/or the polish rate, any uniform conductive material 8 overburden may be obtained as shown in Fig. 3Biii.

IN THE CLAIMS

Kindly cancel claims 9-30.

Kindly enter the following amended claims:

1. (Amended) A method for depositing a conductive material in cavities of a substrate having a barrier layer and a seed layer formed thereon, the method comprising the steps of:

removing certain portions of the seed layer from the top surface of the substrate using a pad material while preventing removal of other portions of the seed layer from the cavities of the substrate;

exposing portions of the barrier layer on the top surface of the substrate after removing certain portions of the seed layer; and

depositing the conductive material on the seed layer in the cavities of the substrate.

Kindly add the following new claims:

31. A method according to claim 1 further comprising the step of applying an electric potential between the substrate and an electrode having the pad material attached thereto during the removal and/or the depositing step.

32. A method according to claim 31, wherein the step of applying the electric potential prevents dissolution of the seed layer in the cavities of the substrate.

33. A method according to claim 31 further comprising the step of applying an electric current density between the substrate and the electrode of 5 to 250 mA/cm^2 during the depositing step.

34. A method according to claim 31 further comprising the step of applying an electric current density between the substrate and the electrode of 7 to 150 mA/cm^2 during the depositing step.

35. A method according to claim 31 further comprising the step of applying an electric current density between the substrate and the electrode of 0.05 to 15 mA/cm^2 during the removal step.

36. A method according to claim 31 further comprising the step of applying an electric current density between the substrate and the electrode of 0.1 to 10 mA/cm^2 during the removal step.

37. A method according to claim 1 further comprising the step of positioning the pad material between 1 micron to 2 millimeters from the substrate during the depositing step.

38. A method according to claim 1 further comprising the step of positioning the pad material on the substrate during the depositing step.

39. A method according to claim 38, wherein the pad material is positioned on the substrate at a pressure between 0.05 to 5 pounds per square inch.

40. A method according to claim 1 further comprising the step of applying a first electric potential between the seed layer and an electrode having the pad material attached

thereto, the first electric potential being applied during the step of preventing removal of other portions of the seed layer from the cavities of the substrate.

41. A method according to claim 40, wherein applying the first electric potential makes the seed layer more negative than the electrode.

42. A method according to claim 40 further comprising the step of applying a second electric potential between the seed layer and the electrode, the second electric potential being applied during the step of depositing.

43. A method according to claim 42, wherein the value of the second electric potential is greater than the value of the first electric potential.

44. A method according to claim 1, wherein the polishing step comprises moving the pad material and the substrate with respect to each other.

45. A method according to claim 1 further comprising rotating and moving the substrate laterally.

46. A method according to claim 1, wherein the polishing step comprises moving the pad material and the substrate with respect to each other.

REMARKS

Claims 1-30 were pending in the application and were subject to a restriction requirement in the parent application Serial No. 09/398,258. In view of the restriction requirement in the parent case, Applicant herein has canceled claims 9-30 and elected claims 1-8 (Group I) for examination in this case. Applicant has also taken this opportunity to amend claim 1 and add claims 31-46 to more fully protect the features of the present invention described in the specification and the drawings. Entry and consideration of the foregoing amendments are respectfully requested.

If there are any questions regarding this application, Applicant's attorney requests an opportunity to discuss this case with the Examiner either in person or by telephone interview.

Respectfully submitted,

Intellectual Property Group of
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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE TITLE:

The title is changed as follows:

[NOVEL CHIP INTERCONNECT AND] PACKAGING DEPOSITION METHODS [AND STRUCTURE]

IN THE SPECIFICATION:

Page 19, first full paragraph starting on line 5:

The sixth element/compound of the conductive material is an agent that passivates or enhances the passivation of copper or other metal materials. These agents may include benzotriazole, or combinations of benzotriazole with organic triazoles, such as benzotriazole-1-acetonitride, benzotriazole-5-carboxylic acid, 0-benzotriazole-1-yl-N, N′, N′-bis (tetramethylene) uronium hexafluoro phosphate and combinations thereof. The concentration of the passivating agents should range from 0.0005M to 0.1M, but preferably between 0.001 M to 0.2 M. Also, the highly leveling additives and the corresponding inhibitors described [describe] above may be used as passivating agents. What is important from this example is that the concentration of the passivating agent is adequate for the CMP process and is also below the threshold level that allows for conductive material deposition. Above this threshold level, hydrogen can be deposited at the cathode instead of the conductive material.

Page 20, second full paragraph starting on line 18:

By depositing at a current density slightly higher than 10 mA/cm^2 (i.e., 10.5 mA/cm^2[cm]), a thin continuous uniform overburden is formed over the entire top surface of

the substrate. The depth of the overburden may range from 0.1-10000 A^0, or even higher, depending on the desired structure. Thus, by varying the deposition rate and/or the polish rate, any uniform conductive material 8 overburden may be obtained as shown in Fig. 3Biii.

IN THE CLAIMS:

Claims 9-30 are canceled.

The claims are amended as follows:

1. (Amended) A method for depositing a conductive material in [the] cavities of a substrate having a barrier layer and a seed layer formed thereon, the method comprising the steps of:

removing certain portions of the seed layer from the top surface of the substrate using a pad material while preventing removal of other portions of the seed layer from the cavities of the substrate;

exposing portions of the barrier layer on the top surface of the substrate after removing certain portions of the seed layer; and

depositing the conductive material on the seed layer in the cavities of the substrate.

Claims 31-46 have been added as new claims.